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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,318	04/01/2004	Jeffrey A. Amelse	37,370	9121

7590 12/27/2007

BP America Inc.
Docket Clerk, BP Legal, M.C. 5East
4101 Winfield Road
Warrenville, IL 60555

EXAMINER	
BOYER, RANDY	

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
12/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/816,318	AMELSE, JEFFREY A.	
	Examiner	Art Unit	
	Randy Boyer	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *19-24* is/are allowed.

6)☒ Claim(s) *1-8,10-18 and 25* is/are rejected.

7)☒ Claim(s) *9 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Examiner acknowledges Applicant's response filed 17 October 2007 containing amendments to the claims and remarks.

2. Claims 1-25 are pending.

3. Examiner acknowledges that Applicant's amendment to claim 22 is sufficient to overcome the previous rejections of claims 22-24 under 35 U.S.C. 112, second paragraph and 35 U.S.C. 101. Consequently claims 22-24 are allowed.

4. Claims 19-21 are allowed.

5. Objection is entered with respect to new claim 25. Likewise, new claim 25 is rejected under 35 U.S.C. 112, second paragraph.

6. The previous rejections of claims 1-4 and 10-12 under 35 U.S.C. 102(b) are maintained. Likewise, the previous rejections of claims 5-8 and 13-18 are maintained. The objection and rejections follow.

Claim Objections

7. Claim 25 is objected to for lack of antecedent basis in the claim.

8. With respect to claim 25, the claim recites, in relevant part: "absorbing said evaporated ammonia from step (a) into a stream comprising a mixture enriched in water

relative to ammonia . . .". Examiner notes that claim 25 recites no "step (a)." Consequently, claim 25 lacks proper antecedent basis for recitation of a "step (a)." Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

In the present instance, claim 25 recites the broad recitation "a low paraxylene concentration of less than about 50 weight percent paraxylene," and the claim also recites "or from less than about 30 weight percent paraxylene" which is the narrower statement of the range/limitation. Likewise, claim 25 recites the broad recitation "a high paraxylene concentration of at least about 50 weight percent paraxylene," and the claim also recites "or of at least about 70 weight percent paraxylene" which is the narrower statement of the range/limitation.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1-4 and 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Weedman (US 3,067,270).

14. With respect to claim 1, Weedman discloses a crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock comprising cooling the hydrocarbon feedstock in at least one refrigerated crystallization stage that is indirectly refrigerated by evaporating at least a portion of a substantially liquid stream comprising ammonia (see Weedman, column 1, lines 66-72; and column 3, lines 30-34).

15. With respect to claim 2, Weedman discloses wherein the substantially hydrocarbon feedstock comprises hydrocarbons consisting essentially of ethylbenzene,

paraxylene, metaxylene, orthoxylene, and hydrocarbon impurities (see Weedman, column 1, lines 70-72).

16. With respect to claims 3 and 4, Weedman discloses wherein the substantially hydrocarbon feedstock comprises a low paraxylene concentration of less than about 30 weight percent paraxylene (see Weedman, column 2, lines 17-32).

17. With respect to claim 10, Weedman discloses wherein the indirect refrigeration comprises vaporizing a substantially liquid stream comprising ammonia by transfer of heat from the substantially hydrocarbon feedstock to the substantially liquid stream comprising ammonia (see Weedman, column 3, lines 30-33).

18. With respect to claim 11, Weedman discloses wherein the indirect refrigeration further comprises the substantially liquid stream comprising ammonia not in direct contact with the substantially hydrocarbon feedstock (see Weedman, column 3, lines 30-33; and drawing).

19. With respect to claim 12, Weedman discloses wherein the indirect refrigeration further comprises the substantially liquid stream comprising ammonia and the substantially hydrocarbon feedstock located on opposite sides of a heat transfer surface (see Weedman, column 3, lines 30-33; and drawing).

Claim Rejections - 35 USC § 103

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

21. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

22. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hubbell (US 5,811,629). Alternatively, claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hubbell (US 5,811,629), as evidenced by Weedman (US 3,067,270).

23. With respect to claim 5, Hubbell discloses a crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock in at least one refrigerated crystallization stage that is indirectly refrigerated by evaporating at least a portion of a substantially liquid stream (see Hubbell, Abstract; and column 7, lines 17-64); wherein the substantially hydrocarbon feedstock comprises a paraxylene concentration of at least about 50 weight percent paraxylene (see Hubbell, column 12, lines 50-54).

Hubbell does not disclose wherein the substantially liquid stream comprises ammonia.

However, ammonia is known in the art to be an effective refrigerant for use in the crystallization of a hydrocarbon feedstock to recover paraxylene (see e.g., Weedman at column 3, lines 30-33).

Therefore, it would have been obvious to the person having ordinary skill in the art at the time the invention was made to use ammonia as the refrigerant in Hubbell's crystallization process.

24. With respect to claim 6, Hubbell discloses wherein the substantially hydrocarbon feedstock comprises a high paraxylene concentration of at least about 70 weight percent paraxylene (see Hubbell, column 12, lines 50-54).

25. Claims 7, 8, and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weedman (US 3,067,270). Alternatively, claims 7, 8, and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weedman (US 3,067,270), as evidenced by Singh (H. Singh and F. Castillo, *Process Life Cycle Solutions for the Case of Automated Heat Exchanger Network Retrofit*, 22 APP. THERM. ENG. 949-958 (2002)).

26. With respect to claim 7, Weedman discloses a crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock comprising cooling the hydrocarbon feedstock in at least one refrigerated crystallization stage that is indirectly refrigerated by evaporating at least a portion of a substantially liquid stream comprising ammonia (see Weedman, column 1, lines 66-72; and column 3, lines 30-34);

wherein at least one crystallization stage is cooled by heat exchange with an ethylene refrigerant (see Weedman, column 3, lines 13-15).

Weedman does not disclose wherein the ethylene refrigerant has been cooled with a stream comprising ammonia.

However, heat transfer and heat exchange between process streams is well known in the chemical engineering arts and well within the competence of the person having ordinary skill in the art (see e.g., H. Singh and F. Castillo, *Process Life Cycle Solutions for the Case of Automated Heat Exchanger Network Retrofit*, 22 APP. THERM. ENG. 949-958 (2002)).

Therefore, it would have been obvious to the person having ordinary skill in the art at the time the invention was made to modify the process of Weedman to provide for cooling of the ethylene refrigerant via the interprocess heat exchange between the ethylene and ammonia streams, e.g. in order to make the process more economical in terms of energy consumption.

27. With respect to claim 8, Weedman discloses wherein the at least one crystallization stage removes from the hydrocarbon feedstock a stream of at least 69 weight percent paraxylene (see Weedman, column 4, lines 20-23).

28. With respect to claim 13, Weedman discloses a crystallization process for recovering paraxylene from a substantially hydrocarbon feedstock comprising cooling the hydrocarbon feedstock in at least one crystallization stage cooled by an ethylene refrigerant.

Weedman does not disclose wherein the ethylene refrigerant has been cooled by

heat exchange with a substantially liquid stream comprising ammonia.

However, heat transfer and heat exchange between process streams is well known in the chemical engineering arts and well within the competence of the person having ordinary skill in the art (see e.g., H. Singh and F. Castillo, *Process Life Cycle Solutions for the Case of Automated Heat Exchanger Network Retrofit*, 22 APP. THERM. ENG. 949-958 (2002)).

Therefore, it would have been obvious to the person having ordinary skill in the art at the time the invention was made to modify the process of Weedman to provide for cooling of the ethylene refrigerant via the interprocess heat exchange between the ethylene and ammonia streams, e.g. in order to make the process more economical in terms of energy consumption.

29. With respect to claim 14, Weedman discloses wherein the substantially hydrocarbon feedstock comprises hydrocarbons consisting essentially of ethylbenzene, paraxylene, metaxylene, orthoxylene, and hydrocarbon impurities (see Weedman, column 1, lines 70-72).

30. With respect to claims 15 and 16, Weedman discloses wherein the substantially hydrocarbon feedstock comprises a low paraxylene concentration of less than about 30 weight percent paraxylene (see Weedman, column 2, lines 17-32).

31. With respect to claim 17, Weedman discloses wherein the at least one crystallization stage removes from the hydrocarbon feedstock a stream of at least 69 weight percent paraxylene (see Weedman, column 4, lines 20-23).

32. With respect to claim 18, Weedman discloses wherein the stream is slurried at least once and melted to produce a final paraxylene product (see Weedman, column 3, lines 7-29).

Allowable Subject Matter

33. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

34. Claims 19-24 are allowed.

35. Claim 25 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office Action.

Response to Arguments

36. Applicant's arguments filed 17 October 2007 have been fully considered but they are not persuasive.

37. Examiner understands Applicant's principal arguments to be:

I. The use of ammonia as taught by Weedman is a direct refrigeration process where ammonia directly contacts the crystal feed.

II. The refrigeration process taught by Hubbell is a direct cooling process.

38. With respect to Applicant's first and second arguments, Examiner begins by noting Applicant's own definition of "indirect heat transfer" which Applicant uses in

reference to the refrigerated crystallization stage that is "indirectly refrigerated" by evaporating at least a portion of a substantially liquid stream comprising ammonia (see Applicant's claim 1). Specifically, Applicant provides: "Indirect heat transfer means that *the refrigerant is not in direct contact with the material being cooled*, but rather, *the refrigerant and the material being cooled are on opposite sides of a heat transfer surface*" (see Applicant's specification, page 23, lines 9-11; and page 28, lines 4-6) (emphases added). Examiner acknowledges that Applicant's definition of indirect heat transfer is consistent with Examiner's understanding of the term as well as those having ordinary skill in the art.

Examiner next notes that Weedman uses a "scraped-surface chiller" as the means for crystallizing the hydrocarbon feedstock in his crystallization process (see Weedman, column 3, lines 30-34). Likewise, Hubbell discloses the use of a "scraped-surface double-pipe heat exchanger" in his crystallization process (see e.g. Hubbell, column 7, lines 44-53).

Examiner submits with that the scraped-surface heat exchangers of the type used by both Weedman and Hubbell are well-known means of ***indirect*** heat transfer as Applicant has defined that term and as it is understood by those having ordinary skill in the art. Specifically, Examiner cites the following as additional evidence that scraped-surface heat exchangers are means of ***indirect*** heat transfer: (1) Born (US 2,809,815) (see entire disclosure; and especially Figs. 1, 2, and 3 with accompanying text, and column 2, lines 64-71); (2) R.L. Shilling et al., *Heat-Transfer Equipment* in PERRY'S CHEMICAL ENGINEERS' HANDBOOK, 7th ed. New York, McGraw-Hill, 1997, pp.11-32 – 11-

33; and (3) "Scraped Surface Heat Exchangers," SPX Process Equipment Co. (2006), available at http://www.spxprocessequipment.com/sites/wcb/products/heatex/PDF/pe-1530_votsshe_wcb.pdf.[1]

Conclusion

39. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

40. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Boyer whose telephone number is (571) 272-7113. The examiner can normally be reached Monday through Friday from 10:00 A.M. to 7:00 P.M. (EST).

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[1] The references are cited only as evidence that surface-scraped heat exchangers are means of indirect heat transfer. Examiner's use of these references does *not* constitute a new grounds for rejection.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola, can be reached at (571) 272-1444. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RPB

Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700